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ABSTRACT
                 A study conceptualized bases for learning in workplaces,
examining reciprocity between how individuals are afforded access to
workplace activities and guidance and how workers elect to engage in what
they are offered. These reciprocal bases for thinking, acting, and learning
are called "co-participation at work." The contributions that workplaces make
to workers' learning primarily comprise the structuring of learners' access
to workplace activities and guidance. These affordances or invitational
qualities include how workplace activities and guidance are distributed and
accessed, and by whom. Reciprocally, beyond what the workplace offers, what
workers learn and how they draw upon and transform their ways of knowing
about work is shaped by how they elect to engage in work activities and
construe the invitational qualities of what is afforded. Recent accounts of
reciprocity in relations between mind and social practice have emphasized the
interdependencies or relatedness between individuals' acting and social
practice, including the workplaces in which they act. A key premise is that
engagement in work and what is learned through work are shaped at the
intersection between the evolving social practice of the workplace and
individuals' ongoing development founded in their ontogeneses. Therefore, an
understanding of participation in and learning at work illuminates relations
between social and cognitive contributions to adult development throughout
working lives. (Contains 48 references.) (Author/KC)

Workplace learning as co-participation

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This paper conceptualises bases for learning in workplaces, comprising reciprocity between how individuals are afforded access to workplace activities and guidance, and how workers elect to engage with what is afforded them. These reciprocal bases for thinking, acting and learning are referred to as co-participation at work (Billett 2001a). The contributions that workplaces make to workers' learning primarily comprise the structuring of learners' access to workplace activities and guidance. These affordances or invitational qualities include how workplace activities and guidance are distributed and accessed, and by whom. Reciprocally, beyond what the workplace affords, how individuals elect to engage in work activities and construe the invitational qualities of what is afforded shape what they learn, and how they draw upon and transform their ways of knowing about work. Recent accounts of reciprocity in relations between mind and social practice, such as those of Valsiner (1994) Valsiner and Van de Veer (2000), Wertsch (1991, 1998), Cole (1998) and (Lave 1991), have emphasised the interdependencies or relatedness between individuals' thinking, acting and learning, and social practices and sources. These and other accounts (e.g. Cobb 1998; Scribner 1997b; Valsiner 1992) also acknowledge the complexity of the interdependencies between individuals' acting and social practice, including the workplaces in which they act. A key premise here is that engagement in work and what is learnt through work are shaped at the intersection between the evolving social practice of the workplace and individuals' ongoing development founded in their ontogeneses. Therefore, an understanding of participation in and learning at work illuminates relations between social and cognitive contributions to adult development throughout working lives. Findings from a study that examined participatory practices in a workplace, illuminates and illustrates these conceptual premises.

Introduction

For those interested in the development of a workplace pedagogy, key concerns include understanding how individuals come to learn and develop further their vocational practice through work and throughout their working lives, and how that learning can be best supported and enhanced. Such concerns both draw upon, reflect and may ultimately inform deliberations within sociocultural, cultural psychology and historical activity theories. The focuses of these deliberations include: (i) the relations between engagement in the social practice of work and adults' learning and development; (ii) the relations between individuals' ontogenies (life histories) and history; and (iii) evolving conceptions of inter-psychological processes — those between individuals and social sources — and intra-psychological outcomes — cognitive change within individuals arising from social experiences. These deliberations are unified by an overall concern to understand further the relations between individuals' development and social practice, manifesting itself here in a discussion about what comprises learning through work. The reciprocal bases that underpin learning through and throughout working life, albeit through engagement in everyday activities or through intentional guided learning at work, are proposed as workplace participatory practices (Billett 2001c). This paper advances the concept of co-participation at work (Billett 2001a): the reciprocal process of how the workplace affords participation and how individuals elect to engage with and participate in work. It emphasises mutuality in relations between contributions to learning afforded by the workplace, on the one hand, and how individuals decide to act in that practice, on the other. Both kinds of participatory practice influence how (and which) individuals engage in vocational activities and how and what they learn or come to know. The affordances (Gibson 1969) of the work practice are proposed as shaping individuals' participation at work and thereby mediating their learning. The kinds of activities and guidance individuals are able to access will shape their learning. However, this participation, and hence learning (Rogoff 1995), is also mediated by how individuals construe what is being afforded (i.e. as invitational).

Co-participation is constituted at the intersection of the trajectories of the evolving social practice that constitutes the particular workplace, and individuals' socially shaped personal histories or ontogenies (see Figure 1). However, not depicted in Figure 1 is individuals' simultaneous participation in other social practice (e.g. family and community life) that influences their participation at work (Lave & Wenger 1991; Billett 1998b). These practices include those directly influencing engagement in the workplace, such as membership of a trade union or professional groups, or involvement in recreational activities with coworkers. Other forms of participation, such as family commitments and participation in the local community groups or other work commitments also influence individuals' participation at work. For instance, Hull (1997) notes that some contingent workers (i.e. part-time, contractual) are required to engage

in multiple jobs, which influences their participation in each and may inhibit their ability to participate fully in a desired work situation.

Figure 1: Intersection between evolving social practice and evolving ontogeny
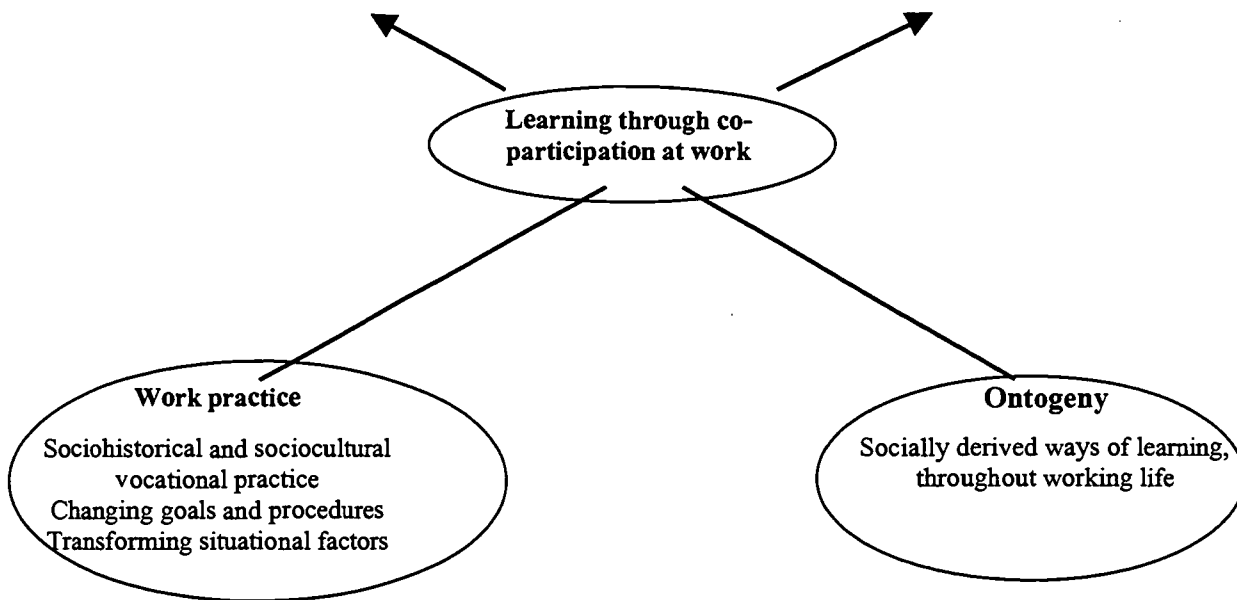
There is some consensus about the relationship between engagement in conscious goal-directed activities and the processes of learning — a process that leads to some kind of semi-permanent change in individuals. Within both the sociocultural (e.g. Rogoff 1990, 1995) and cognitive constructivist perspectives (e.g. Anderson 1993; Shuell 1990) the kinds of goal-directed actions in which individuals engage are held to shape, refine and reinforce the knowledge they construct. With their historical, cultural and situational geneses, access by individuals to activities afforded by the workplace shapes their access to this work-related knowledge. Therefore, the kinds of activities in which individuals are permitted to engage (e.g. the degree of their routineness) have consequences for their learning. Intentional learning opportunities, such as close guidance by more expert coworkers, enhance the prospect that engagement in work activities that will generate rich learning in ways that everyday participation at work may not achieve alone (Ericcson & Lehmann 1996). In particular, accessing the kinds of knowledge that is not easily learnt alone — for example, heuristics (i.e. tricks of the trade), conceptual knowledge that is opaque or just hard-to-learn — are dependent upon interactions with more experienced coworkers.

Rather than being unidirectional, there is reciprocity in both engagement in and learning through work. Ultimately, individuals exercise agency that determines how they engage with the activities and guidance afforded by the workplace (i.e. whether it is full-bodied or superficial engagement), and also what they learn through that engagement; the intra-psychological outcome. Wertsch (1998) distinguishes between two distinct forms of intra-psychological outcomes arising from the exercise of this agency. Appropriation refers to a commitment to what is learnt arising from a relatedness of values between the individual and the social practice in which what is learnt is encountered. Learning arising from social press, yet characterised by a lack of relatedness of values and hence low commitment is termed by Wertsch (1998) as *mastery*. The source of this agency is individuals' socially-derived ontogenies or personal histories, which are developed and transformed through unique combinations of participation in different kinds of social practice throughout our lives. Both inter-psychological interactions and intra-psychological outcomes are shaped by individuals' agency. How individuals engage with activities and guidance, and thus come to know, is a product of reciprocity between the affordance of the workplace and how individuals' ontogenies influence their participation in the workplace. In all, the concept of co-participation at work aims to advance a view of learning throughout working life, thereby contributing to the development of a workplace pedagogy and also to discussions about the relations between individuals' cognitive and social experiences (Valsiner & van de Veer 2000) in which doing and learning coalesce.

Relations between social practice and individuals' thinking and acting
The need to identify and understand the relations between the mind and the external world has arisen from the abandonment of the idea there is a separation of mental and physical experience: dualism. Having proposed that the mind is embedded in the social world (Scribner 1997b; Wertsch 1991), the nature of its

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embeddedness, the geneses of knowledge and the ways in which individuals' thinking, acting and learning are influenced by social factors are just some of the relations that now need to be understood more fully. It follows that relations between the mind and the social world necessarily become the focus for understanding how workers' development proceeds across the span of a working life. Some bases for understanding these relations have already been advanced. These include reconciling cognitive and sociocultural theories of learning (e.g. Rogoff 1990, 1995; Billett 1996) that separately and respectively accentuate conceptions of the mind as interacting with and appropriating historical, cultural and situational sources of knowledge. Commonalties and mutual contributions have been identified in this work (e.g. engaging in goal-directed activities, learning as problem-solving), despite the distinct orientations (and some would argue apparently irreconcilability) of these theories. Social practices, such as workplaces, are held as active and mutually constituted components of thinking and acting, rather than as mere contexts in which thinking and acting occur. They also provide opportunities to examine the interweaving of two lines of development: the individual and social (Valsiner & van de Veer 2000). Other work has considered these relations in terms of their distribution across social systems (cognition is shared with others and artefacts) (e.g. Hutchins 1991; Resnick et al. 1997; Suchman 1997). These views refer to knowledge being distributed across the social practice (e.g. the workplace) through its interactions, tools, artefacts, norms, goals and practices. This distribution of cognitive contributions includes the individual acting in the workplace, thereby making an individual's cognition and development dependent on the social system of which they are a part. Some (e.g. Pea 1993) even propose that the individual comprises but one element in that distributed system of learning. However, such views fail to explain the differences in the relative independence of individuals on the one hand, and situational dependence on the other. This variance in thinking and acting are not convincingly explained by positions that emphasise either wholehearted embeddedness or independence. Instead, the degree of relatedness lends itself to being more useful in understanding these relations and a view that there might be times when there is greater situational interdependence and those of lesser situational dependency.

Activities such as those undertaken in the workplace are also held to be reciprocally transformational and mediated through interactions between individuals and social circumstances (Cole 1998; Scribner & Beach 1993; Leonteyev 1981; Wertsch 1991, 1998). Scribner and Beach (1993) make three claims for the relations between knowledge and memory. First, rather than favouring one or the other, activity involves the mutual contribution of memory in the head and memory (stimuli) in the environment. Second, activities are goal-directed, with goals being shaped by particular settings and circumstances. Through engagement in these activities, individuals' cognitive processes are engaged and transformed in some way. Third, memory is viewed as being both social and cognitive, just as salt 'can no more meaningfully be separated into sodium and chloride, while retaining its saltiness' (1993, p. 188). Although not wholly illuminating the character of those relations, these claims emphasise the mutuality of both the social and the cognitive contributions to individuals' learning. Other perspectives emphasise interpersonal and semiotic mediation between social sources and the mind (e.g. signs and tools) (Hutchins 1991; Scribner 1985; Wertsch 1985). In Vygotsky's (1978) view, a distinctiveness of humans is our lack of direct engagement with the environment. Instead, interactions are conducted through the intermediacy of cultural tools and signs — through language, for instance. When we use language, work or otherwise engage in purposive goal-directed activities that have historical and cultural geneses and are patterned by social practices, the organism's cognitive functions are engaged by and developed further through these actions. All of which accentuate the role of social mediation. Scribner (1997a) underscores the significance of this mediation in declaring that, whereas human cognition and development have traditionally been discussed in terms of relations between the organism and the environment, cultural mediators operate as an intermediary between the organism and the environment. So individuals' learning is elaborated upon or extended through engagement in these activities. These ideas have utility in considering the development of individuals' vocational practice through work and in the construction of a workplace pedagogy. Not only does vocational practice have cultural and historical geneses; the way interactions and communications occur, and how the tools and artefacts of vocational practice are developed and deployed, are also socially and culturally constituted. Participation at work reciprocally engages individuals with these sources.

The degree to which individuals are embedded in social practice or act independently is the subject of diverse claims. Here, the interdependence of these relations are proposed in terms of how the cognitive and social experiences that constitute individuals' ontogenies intertwine through participation in social practices. This relationship is based on the following conceptual premises.

Ontogeny and history

Individuals' development across a working life can be conceived as the history of individuals' thinking and acting through continual conscious thought (Meade 1934), with those processes being shaped, mediated and transformed through their participation in socio-historically derived work (Scribner 1985). Vygotsky (following Bolonsky) proposes that 'behaviour can be understood only as the history of behaviour' (Vygotsky 1978, p. 8). Linking ontogenesis with history suggests rich relations among sociohistorical and sociocultural transformations, cultural mediation and individual development. The vocational practice that comprises work, how it is organised and enacted, and the requirements for performance have historical and social geneses, yet are in constant transformation. Over time, changes in sociocultural needs, as manifested in vocational practice, will lead to transformations (e.g. in the printing industry, with typesetting transforming from a hot metal to electronic means), as well as the decline of some vocational practices (e.g. watch repair) and the emergence of others (e.g. website development). These transformations are historically and culturally determined, as vocational practices are the manifestations of sociocultural need (Scribner 1985, Billett 2001b). Accordingly, transformations in vocational practice across the span of a working life inevitably positions closely ontogenetic development with history, because ontogenesis is the product of individuals' unique pathway through a lifetime of engaging in transforming social practices. Therefore, history seems a more salient explanatory principle than phylogenetic development (i.e. evolutionary changes in the species) for human development across a life span. Development across working lives can be seen to be sourced in historical practice and adaptations of human development founded in the historically derived activities and the mediational means by which individuals engage as they participate in work activities. In these ways, work engages individuals with history, and the ontogenetic development that arises from these activities is linked to history.

Reciprocity between inter-psychological processes and intra-psychological outcomes

Conceptions of inter-psychological processes and intra-psychological outcomes, as proposed by Vygotsky (1978), provide useful bases for understanding how learning and doing coalesce at work, the mutuality of relations between the social and the individual. Inter-psychological processes, defined widely, have been emphasised in accounts of distal or indirect contributions to cognition (e.g. Scribner 1985). These processes include observations of practices and the layout of physical environments (e.g. the relations implied by the spatial arrangements in churches and schools (e.g. Barker 1978). Associated with this is the idea of thinking and acting being 'distributed' (e.g. Hutchins 1991) or 'stretched' across (Lave 1991) social practice. These bases accentuate the contributions of the cultural and situational levels of sociogeneses and their contributions to cognitive experience through inter-psychological interactions. Given Vygotsky's use of signs and tools, and concerns with conceptual development, and apparent lack of emphasis on close interpersonal interactions (see Valsiner & Van de veer 2000) the conception of the inter-psychological is clearly extendable to these more distal forms of interactions. Traditionally, psychological accounts of intra-psychological outcomes refer to the product of individuals' internal mentalistic processes and structures (Scribner 1997a). However, for Vygotsky (1978), the 'internal' is something that continues to interact with and be transformed in a reciprocal relations with cultural developments. Rather than a rapid transformation to some fixed internal representation, these are modifiable or transformable through the generation of new categories. This is an important distinction. If sociogenesis is only a means of representing stimuli encountered in the social world, then it would be largely uni-directional (and behavioural). Instead, inter-psychological processes continue to shape intra-psychological outcomes as the 'result of a long series of developmental events' (1978, p. 57) and the 'process being transformed continues to exist and to change as an external form of activity before definitively turning inward' (1978, p. 57). This view proposes that learning arises through ongoing engagement in reciprocal and iterative interactions with social sources and mediation over time, before ultimately becoming an intrapsychological process or representation. The point at which this iterative and reciprocal process ceases and (or even if) some more fixed representation results remains unclear.

In emphasising inner functions arising from 'only extended periods of development', associations are accentuated with changes in activities and interactions that mediate learning. Hence, rather than 'internal' processes being remote from history, the ontogenetic development arising from working life and history can be seen as progressing hand in hand. This suggests that the common view of Vygotsky's (1978) sequencing of cultural development occurring first on the social, and then the individual, plane needs elaborating to account for the ongoing interactions between these two planes of development. Further, not only are these interactions ongoing, but they are reciprocal — shaping and being shaped — rather than wholly turned inward and becoming fixed.

Positioning the individual in sociogenesis

Positioning the individual (the cognitive experience) within sociogeneses (the social bases of knowledge and human development) remains a contentious area of theorising (Scribner 1997b; Smolka, Goes & Pino 1995). As noted, in some accounts, the individual has been positioned as a mere dependent element in the distributed nature of cognition (Pea 1993; Hutchins 1991). Such accounts, by different degrees, may deny individuals acting interdependently within social systems, such as work practice. Other views (e.g. Valsiner 1994; Lawrence & Valsiner 1993) suggest stronger reciprocal bases for thinking and acting. For instance, Cobb (1998) cautions against assuming that all thinking and acting is wholly distributed across social systems. Similarly, Salomon (1994) and Engestrom and Middleton (1996) propose that not all cognitive activity is situated or distributed; instead, individuals are able to act independently in the social world. While supporting the necessity to review the overly individualistic and mentalistic emphasis in mainstream cognitive accounts, Cobb (1998) suggests more circumspection in considering individuals' role in relations between the mind and the social world. In particular, the reciprocity between the individual and social practice implies independence from the immediate social circumstances, as well as interdependence with those circumstances.
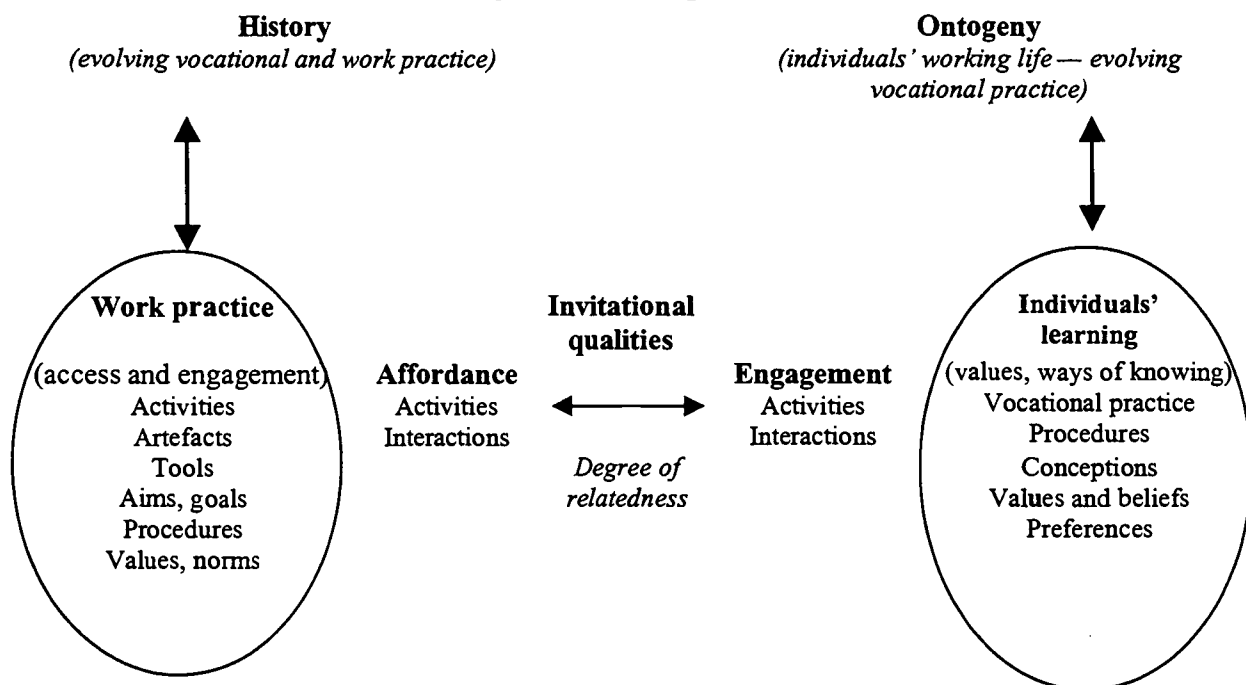
While inter-psychological processes are embedded in social practice, they are not immune from being shaped by the contributions that other social practices have made to their ontogenies. In contesting what Lave & Wenger (1998) proposed about participation and identity, Hodges (1998) has described how participation in a particular social practice (a teacher education course) led her to question the basis of that practice — something that ultimately resulted in her dis-identification with that practice. There were unacceptable inconsistencies between her values and goals and those of the social practice of teaching young children into which she was being initiated. Different patterns of participation and outcomes can be seen as arising from engagement in other kinds of work practices. For instance, some coal miners live in coal mining communities where affiliations extend beyond the workplace and influence activities in those communities. Hence, for these coal miners, participation in social and recreational activities in the communities is influenced by and reinforces cultural norms associated with the coal mining community (Billett 1995). However, other mine site workers are contract workers without union affiliation, and are employed on a 'fly-in and fly-out' basis. Their practice is influenced by different kinds of norms and values from those who live in the coal mining communities. Not only is their engagement and participation within the workplace premised differently, but the kinds of social practices they engage in and identify with, and their participation at work, are also likely to be distinct.

These ideas build upon precepts of the reciprocal process of learning negotiated by individuals through the co-construction of knowledge (Valsiner 1994; Lawrence & Valsiner 1993). Individuals do not construe the invitational qualities or engage in a unitary way within social practices such as workplaces. Valsiner's (1994) refers to degrees of relatedness between individuals and the social practices in which they engage, ranging from *maximum social relatedness* to the *total independence* of individuals acting in the social practice. The basis for these interactions are premised on the degree of concurrence between the individuals' learning (including their values and beliefs), founded in their ontogeny, and workplace cultural norms and values of the workplace. There is interdependence between individuals' agency and the social practice of work. Given the idiosyncratic nature of individuals' experiences throughout their life history, individuals' ontogenetic development will likely result in unique dispositions and ways of learning (Billett 1997; Newman et al. 1989). This development arises from interdependent engagement in social practice of different kinds throughout their ontogenies. It is unlikely that uniformity in either engagement in or outcomes from engagement will arise through individuals' participation in workplaces. It follows that individuals' learning (their approach to learning, problem-solving and transfer) is a product of their unique socially derived histories acting in transforming social practices. In proposing the reciprocity in these relations, the aim is to locate a path between the 'twin hazards' of individual constructivism (particularly when portrayed as being overly mentalistic) and social determinism (Miller & Goodnow 1995).

Co-participation at work

Building on these premises, 'co-participation at work' refers to the reciprocal process of engagement in and learning through work. It refers to how individual are permitted to participate in the workplace, as determined by the affordance or invitational qualities of the workplace, on the one hand, and how individuals elect to engage with and participate in the workplace and, through their participation, construct and refine their learning, on the other. These reciprocal bases are now discussed in turn.

Fig. 2 Co-participation at work

History		Ontogeny
(evolving vocational and work practice)		*(individuals' working life — evolving vocational practice)*

Work practice

(access and engagement)
Activities
Artefacts
Tools
Aims, goals
Procedures
Values, norms

Affordance
Activities
Interactions

Invitational qualities

← →

Degree of relatedness

Engagement
Activities
Interactions

Individuals' learning

(values, ways of knowing)
Vocational practice
Procedures
Conceptions
Values and beliefs
Preferences

Affordance of the workplace

Individuals participate in, and come to know about, vocational practice through access to workplace activities and guidance. This access mediates the construction, refinement and reinforcement of learning as they draw upon and transform existing ways of knowing about work through their participation at work. Working life, of necessity, involves engagement with socially determined activities, goals, partners, tools and signs. Through this engagement, individuals' learning is socially mediated by: (a) the goal-directed activities in which they engage being a product of social practice, through which doing and learning coalesce (Engestrom 1993; Luria 1976; Leonteyev 1981; Wertsch 1991, 1998) microgenetically — moment-by-moment (Rogoff 1990); (b) the close interpersonal interactions between social partners being the means by which learning is made accessible and through which its development can be guided (Vygotsky 1978; Rogoff 1990); and (c) the more indirect (distal) mediation of social and cultural practices upon individuals' thinking and acting (Scribner 1985; Cole 1985, 1998), such as through observation, imitation and through those provided by workplace artefacts.

Individuals' participation and learning through work is rendered variable by workplace practices. Each workplace likely privileges particular goals and procedures that are a product of its unique activity system (Billett 2001b). It follows that the way workers participate in and learning is influenced by how they are invited to participate in activities and the guidance they can access. These constitute its invitational qualities — in particular, by gaining access to knowledge that will not be learnt alone or through imitative acts requiring intentional close guidance. However, workplaces are contested environments and opportunities to access activities and guidance are distributed unevenly. That is the norms and practice of the workplace, shape the distribution of opportunities to engage and secure guidance.

Understanding workplace affordances requires a consideration of the social practice of work as being situationally constituted, which shapes the activities, norms, guidance and participatory practices. Although vocational practice has a socio-historical genesis, it is manifested in particular ways by cultural need (Scribner 1985), with situational factors shaping the situational basis for performance (Billett 2001b; Scribner & Beach 1993; Engestrom 1993). The knowledge to be constructed, the kinds of problems to be resolved, the problem solutions, and the kinds of support and guidance available are the product of local ordering (Suchman 1996) and negotiations (Engestrom & Middleton 1996). Together, these orderings and negotiations shape the affordances advanced to particular individuals or cohorts of individuals. These affordances include the activities individuals can participate in and the guidance they receive. These affordances are central to inter-psychological processes of coming to know. The kind of goal-directed activities individuals are invited or able to engage in (i.e. whether they are routine or non-routine) will likely have consequences for what they come to know through their participation. The availability of access to direct guidance in the workplace (required to access knowledge that would otherwise not easily be learnt) also influences what individuals will come to know during their working lives. Equally, the willingness of co-workers to provide

guidance, to whom and under what circumstances, shapes the quality of access to that knowledge. Workers who fear displacement are unlikely to support the learning of those they fear will displace them (Lave & Wenger 1991).

The invitational qualities of the workplace are also constituted by workplace hierarchies, group affiliations, personal relations, workplace cliques and cultural practices, and the kinds of activities in which individuals are able to or are requested to engage (Billett 2001a). Opportunities to participate in activities, access support and guidance are not distributed equally across participants. Beyond judgments of individuals' competence, bases for affordances include race (Hull 1997), gender (Tam 1997), worker or employment status (Darrah 1996) and affiliations (Billett 1999). Darrah (1996) notes support for learning being directed to those workers who were most valued in the workplace, whereas other co-workers whose tasks were equally demanding were denied support. Coal workers whose affiliations were not acceptable to other co-workers were denied access to practise on the plant and equipment required to become competent in new work tasks (Billett 1995). Contingent workers (i.e. those who are part-time and contractual) struggle to be kept informed and participate fully (Tam 1997), and to be granted opportunities to expand their role and be supported by guidance from full-time employees (Bernhardt 1999). In these ways, the invitational qualities of the workplace are far from benign or evenly distributed. In sum, while workplaces can afford access to activities and guidance required for maintaining and developing adults' vocational practice through work, the invitational bases for participation are contested and not equally distributed to all who want to participate in them. So a complex of social factors shapes work practice and its participatory practices and potential for coming to know through participation.

Individuals' participation as engagement at work

Despite the significance of the contributions of social practice such as those identified above, individuals' learning is not socialisation or enculturation arising from participation in social practice. As foreshadowed, individuals' agency also determines how they participate and engage in activities and responded to guidance they are being afforded. There are distinct bases for conceptualising individuals' participation in social practice. As noted, individuals participate simultaneously in a range of social practices and are unlikely to split their time, effort and attention uniformly among these practices (Billett 1998b). Instead individuals' interests and priorities direct participation. Full-bodied participation in one social practice may be contrasted by reluctance in another. This is referred to as *relatedness* (Valsiner 1994) between the norms and values of the social practice and individuals' values and preferences (see Figure 2). Therefore, understanding the bases for reciprocal and negotiated interactions need to account for the degree of concurrence between the individuals' learning (including their values and beliefs), founded in their ontogeny, and in the workplace's cultural norms and values. For instance, individuals might engage effortfully in their paid vocational activities while participating less effortfully (or even resentfully) in the rostered school tuckshop activities, working bee or the annual school fete, or vice versa. Similarly, some aspects or applications of work tasks will be treated less favourably or preferentially by some workers than others. Underground coal miners have expressed reluctance to engage in open-cut coal mining, which they see as a lowly kind of mining; and hairdressers from trendy inner-city salons may be quite uninterested in working in a suburban salon. Workers of Vietnamese heritage in an American computer manufacturing company resisted the implementation of teamwork which they conceptualised as reflecting 'communist' values of collective rather than individual action — the very thing they had fled from Vietnam to escape (Darrah 1997). Coal miners who viewed safety training programs as the mine site management's attempt to transfer the responsibility for safety on to the miners participated in the training program with reluctance and suspicion (Billett 1995). In the reciprocal act of knowledge construction, both the object and the subject are transformed (Lawrence & Valsiner 1993). This emphasises not only the participatory and identification consequences of relatedness, but also the intra-psychological outcomes. Analogously, interactions between individuals and social practice are reciprocal and interdependent. They are co-participative.

Procedures

The investigation, whose findings are reported here, comprised a two year study of the implementation of guided learning in a large Australian enterprise (Billet & Boud 2001). In part, the study aimed to identify and illuminate workplace participatory practices, including how situational factors (e.g. local orderings and negotiations) shape workplace affordances and how they, in turn, influence individuals' participation and learning through work. The site of the investigation is a food manufacturing plant. Three work areas (customer service, manufacturing and packaging) were selected for the investigation. Experienced workers from each of the three work areas were identified and prepared for their roles as Learning Guides, which

included the use of particular guided learning strategies (e.g. coaching, modeling, questioning etc). The guides were selected on the bases of their technical expertise and predicted capacities to guide others' learning. Also, 17 workplace learners were identified as informants across the three work areas. Initial, progress and summative interviews of learners were conducted to gather data about: (i) their learning in the workplace, (ii) their interest in learning; and (iii) the invitational qualities of the workplace in assisting that learning. Four rounds of critical incident interviews were also conducted throughout the year. These interviews elicited grounded data on the efficacy of the guided learning strategies and other contributions to learning in response to recent workplace tasks. Also observations of work practices were conducted. The data comprise qualitative accounts of the work tasks and quantitative measures of the effectiveness of contributions to learning through work, including the guided learning strategies, and the frequency of their use. In the critical incident interviews, having describing three kinds of workplace impasses, learners reported the utility of each of the strategies in resolving these impasses. That is, their relative contributions to learning new knowledge about work. Qualitative data were also gathered describing and justifying the bases for the statements about their effectiveness. Progress interviews were conducted with the guides and learners after the first four months. These gathered qualitative data about strategy use, perceptions of their effectiveness and factors assisting or inhibiting learning in the workplace. Finally, summative interviews of learners and guides were used to gathered data on the use and effectiveness of guided learning and factors that assisted or inhibited its use. The analysis of participatory practices is perilous. In trying to identify workplace affordances, there is an attempt to capture the pre-perceptual qualities of the workplace. Earlier attempts which adopted this approach (e.g. Barker 1968, 1978) have been criticized for presenting these as objective, rather than being subject to interpretation. So the interview, critical incident and observational data aims to elaborate an account of these affordances, fully aware that the ways in which they are construed as invitational is subject to the negotiation that occurs inter-psychologically as is depicted in Figure 2.

Some findings
The findings on the effectiveness of the use of workplace guided learning strategies are reported elsewhere (Billett & Boud 2001), although referred to here when they illuminate reciprocal workplace participatory practices. The interview, observational and critical incident data identified workplace participatory practices and their consequences for learning. How workplace affordances were manifested in the three work areas were identified as were factors associated with workers' engagement in the workplace. Overall, patterns arising in initial analyses illuminated differences in the affordances of each work area that shaped the opportunities and access to guidance being afforded. Moreover, the data also identify shifts in workers' perception of workplace affordances. There are tentative links between these affordances and the quality of the kinds of learning that the workers constructed. These data identify inter-psychological contributions. They also suggest that the contributions, which include both the intentional guided learning strategies and everyday experiences, make different yet complimentary contributions to the development of the workers' knowledge. In procedural terms they suggest that everyday participation without guided learning, and vice versa, may be limiting. Collectively, the data can be interpreted to infer that, when used, the intentional guided learning strategies demonstrate some potential to achieve its goals of developing and extending knowledge (Billett & Boud 2001). However, the perceived utility of the guided learning and learning was not uniform across the three work areas (see Table 1). The frequency of strategy use varied across the three work areas, and was optimal in none. Factors other than perceptions of utility determined both their use and the bases for reporting their utility.

Participatory factors
The guide learning strategies provide an instance of participatory processes, and their variance across the work areas illuminated some differences in participatory practices. Although used as part of everyday work activities, the guided learning strategies require intentional deployment, and took time and effort to use. The press of production goals influenced the time and effort expendable by the guides to use these strategies. Opportunities for their use (e.g. as new tasks arose) often coincided with heightened production demands and it was proposed to be often inexpedient to proceed with guided learning at these times. A lack of time to use the strategies, a lack of replacement staff and options for pausing to use the strategies were proposed generally as impediments. These concerns were common across the three work areas. However, there were variations in terms of the frequency of use, factors that determined how the guides interacted with the learners and how the learners decided to engage in the workplace learning processes. That is, there were factors in each work area that shaped how individuals constructed the invitational qualities of what the

workplace afforded them and consequently how they elected to engage in work activities. But one measure of workplace affordances is the frequency of the use of the guided learning strategies.

Table 1 -Differences in strategy use across three work areas.

Area	CI#1	CI#2	CI#3	CI#4
Customer Service	11d, 4w, 1m (n=4)	9d, 5w (n=4)	3d, 5w, 8m (n=4)	8d, 4w, 3m (n=4)
Extrusion	7d, 5w, 4m (n=4)	7d, 4w, 3m (n=4)	2d, 8w, 7m (n=4)	3d, 8w, 6m (n=4)
Packaging	24d, 3w, 11m (n=9)	19d, 7w, 9m (n=9)	4d, 9w, 8m (n=8)	5d, 7w, 7m (n=7)

Table 1 presents data about the reported frequency of the use of the guided learning strategies (d = daily; w = weekly, m = monthly) during the four rounds of critical incidents interviews (CI#1-4). When comparing the frequency of strategies are used the relative highest frequency of strategy use and consistency of use was in the Customer Service area. The relative lowest was in Extrusion. There was a general reduction in frequency of strategy use throughout the project. However, it was not uniform. For instance, the reduction was greater in the Packaging and Extrusion areas than in the Customer Service areas. The workplace circumstances of the Extrusion area declined over the period of the year with discontinuity of production and raising uncertainty about the future of the employment of the workers, and worker cynicism was supported by a ban on funds for training. The Packaging area, where many workers reported positive affordances in the first half of the year, also became more skeptical and critical after they were told that there was a freeze on overtime and training. Access to training was linked to opportunities for promotion. In contrast, the Customer service area was given new responsibilities, yet had to contend with a new information system. So these measure of perceived frequency of guided learning strategy use that there were differences in the levels of workplace affordance across the three work areas and that these affordances changed over time. Importantly, there were also associations between the perceived frequency and kind of workplace affordances (e.g. engagement in activities and support) and the kinds of learning required for the performance of workplace tasks identified through the critical incident interviews (see Billett & Boud 2001). Therefore, the variations level of guided learning, as one instance of workplace affordances, indicates differences in and relations between affordances and prospects for learning.

Different bases for participation across the work areas
From the progress and summative interviews, data were gathered to identify what encourages participation at work and on what bases these individuals would their workplace as strongly inviting their participation. Overall, these affordances were identified as the work area's capacity to provide: Access to other workers; Time to practice and learn; Inclusion in knowledge sharing; Discussion groups; Access to knowledge; Implementation of training programs; Encouragement; Attitude and skills of co-workers; and Opportunity to practice. However, the three work areas have quite distinct work practices, shift arrangements, continuity of work, team size, technologies and focus. Moreover, the bases of participatory practices and affordances were distinct. An elaboration of the variations in practice is not possible here, however, some illustration is warranted.

In the Customer Service area, all workers are on the same day shift, they enjoy collegiality within and outside of their work area. They are all female, many of whom are long time employees in this area. They work in close proximity to each other. Regular team meetings and briefings are held in this area. Their work is homogenous and the workers share common concerns in addressing and responding to customer concerns. During the year of the project, the role of this work area expanded and became more complex, as they took on corporate responsibilities for client servicing. Towards the end, a new data management system was also introduced. Both of these changes made particular demands upon the workers. The Manufacturing area has three rotating shifts, its workers, all males, were drawn from other, now disbanded, work areas. Throughout the year, there were periods of discontinuity in their work when product sales declined and the work teams were found work in other area during these periods. In this work area, there was no opportunity for promotion or increased remuneration to be secures through undertaking additional training because all the allocated number of senior positions were occupied. There is limited prospect of staff movement in this area. The environment is very noisy (requiring ear protection to be worn at all times) making direct communication difficult. The work teams in the Packaging area have been recently formed as a result of the enhanced mechanisation of packaging and packing the products. It is also a noisy work area, requiring ear protection to be worn at all times. The small teams worked on three shifts and comprised combinations of male and female workers. There was a positive perception of and attitude towards 'management' (at least initially) and interactions between higher classification workers and other workers in this work area were

also viewed quite positively. There remained the prospect for promotion based on the demonstration of workplace competence, as the quota for higher level positions had not been fully met

Table 3 presents summaries of data from the progress interviews that identified factors that encouraged or inhibited participation in work activities (i.e. the invitational qualities) and which shaped workers' engagement in the workplace. One distinctive difference is whether the motivation to learn arises from contributing to the work team, the tasks it faced or individual need. The data depicts qualities in each work area and presents different bases for participation – affordances. For instance, opportunities for promotion and increases in remuneration were seen as key motivators in Manufacturing and Packaging. However, it was not all to do with remuneration. In the Customer Service and Packaging areas, a key goal was to be seen as an effective member of a high performing team (see below).

Table 2 Influence of work practice and motivational bases in each work area.

Area	Work practices encouraging/inhibiting learning (affordances)	Motivations to learn (engagement)
Customer Service	*Encouraging* – training schedule, positive feedback, demanding work, support from manager and coworkers, team support and feedback *Inhibiting* – changes to work through legislation, products and procedures. Time and reports	Interest, perform work effectively, valued team member, work effectively
Extrusion	*Encouraging* – team work, management's plan, *Inhibiting* – Doesn't encourage participation, support from supervisor (level 4), lack of training, lack of incentive, management's attitude	Learn as much as possible quickly, personal achievement, adequate training and recognition for achievement, like learning new things
Packaging	*Encouraging* – management support and interest, team meetings, circulates and asking of questions by production manager, opportunity to train, management support *Inhibiting* – rotating shifts, product and packaging not organised enough, inequity in access to opportunity to train, not enough trainers to support learning, focussed ongoing training lacking, shortage of staff	Pride in work, job security, effective work practice, promotion and increased responsibility, enhanced understanding of work, job satisfaction, promotion and job security

Individuals' Engagement

The other dimension of participation at work is how individuals elect to engage in the workplace. The bases that underpin individuals' engagement are the product of their personal histories or ontogeneies, which is shaped by their social-derived experiences throughout their lives. The importance of these bases is their relatedness to the values and practices of the workplace. The degree of relatedness is central to Valsiner (1994) view about the co-constructve qualities of learning. Bases by which individuals would engage fully in the work place identified in the progress interviews included: Satisfaction with performance; Improving performance; Self-interest; Self-motivation; and Advancement. These illustrate differences in bases for individuals' engagement in their work and, consequently, how they engage in the effortful process of learning new knowledge. Self-interest was sometimes directed towards securing employment or promotion (self-advancement), or holding on to a job. Others were concerned to improve their own work performance, for personal and promotional reasons. Satisfaction with performance is illustrative of how individual factors' mediate participation. For instance, workers in the Customer Service worked collaboratively and supportively. Consideration of others in the team was a key factor. In the Packaging area, workers' efforts were also directed to being seen as a competent team member and for the team to be effective. For instance, workers would move quickly to overcome production blockages or faults in the packing equipment. If a fault occurred that required the plant to stop, workers immediately began to perform other tasks without any direction or request from the team leader. Key goals for these workers included being able to hand-over to the incoming shift with production targets met and without them having to resolve the relinquishing team's problems. In the manufacturing plant, performance was often more focussed on individual goals, as the teams appeared less formed and there were tensions between workers in the teams. There were also examples of individuals who were pursuing quite pragmatically personal goals (promotion, job security), which was understandable from their perspective.

The workplace environments and the workers' perceptions of the invitational qualities were not fixed, as they transformed over time. As noted, towards the end of the year-long period of the study, the Packaging and Manufacturing areas were informed that training and overtime funds were being curtailed.

Although not directly effecting the provision of the guided learning, this decision reinforced the view of the workers in the Manufacturing area and transformed those in the Packaging area about the invitational qualities of the workplace and their participation in the guided learning activities. This resulted, for instance, in more critical views from the Packaging area workers compared with their previously benign and supportive view of the workplace affordances. Almost universally, they questioned whether the company was really interested in improving production and productivity as they were curtailing training. There followed a shift in participatory practices. The invitational qualities became constructed as being degraded and were constituted more critically and cynically. This kind of shift is significant. Overall the data, there was a correlation between the perceived degree of affordance and the kinds of learning that occurred across the work areas. For instance, the highest frequency of usage and learning outcomes as reported through critical incidents was in the Customer Service area, the lowest in Manufacturing (see Billett & Boud 2001). The Packaging area's commitment to and valuing of the guided learning was initially high declined after the decision to reduce training and overtime. These findings illustrate, the reciprocal nature of participatory practices can be seen as shaping the kinds and quality of learning arising in the workplace. The localised factors and negotiations that occur are exemplified in the differences across the three work areas. Within this analysis is also the need to consider individuals' subjectivity. The plant is set in a rural area. Identity and concepts of masculinity and femininity are in some ways established in the local communities. Concerns about employment and individuals' emphasis on self preservation in the Extrusion plants probably need to be explained in part by subjectivity. Individuals are highly visible in the communities that provide the work force for this plant. There are few other opportunities. The role for males in providing income and access to the attributes to participate in the local community is not divorced from their employment and its status. The threat of loss of employment in a masculine work environment such as the extrusion area likely had a series of consequences for those males. So it seems that cultural practices and conceptions engendered in local communities, had a parallel and profound impact on workplace participatory practice, and therefore learning.

In the ways outline above, co-participatory processes can be seen as shaping participation, and importantly the kinds of learning arising from engagement in workplace activities. Whether the learning was superficial (as in mastery) or appropriated was shaped by the means that individuals elected to engage in workplace activities. Importantly, whether learning proceeds through everyday activities or intentional interventions such as guided learning strategies, workplace participatory practices will shape how and what is learnt. Therefore, as well as elaborating upon inter-psychological processes, these factors likely form the core foundations of a workplace pedagogy.

Concluding comments

In sum, the conceptual significance of co-participation at work can be seen as illuminating relations between the social world and the individual's development as an intersection between the trajectories of the constantly transforming social practice of the workplace in which individuals engage and individuals' evolving ontogenies as they participate in different kinds of social practice. Necessarily, this task needs to commence with identifying, detailing and understanding the nature and consequences of these relations. An examination of working life as co-participation seeks to support this endeavor.

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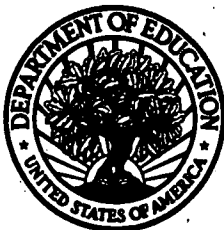
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